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16. Abstract

The purpose of this manual is to provide comprehensive guidelines on heat straightening repair techniques for damaged steel bridge members. The manual is designed to be used in conjunction with a multimedia instructional computer program and video produced as part of this project.

The manual is divided into three parts. Part I provides a background and overview of the heat-straightening process. The introductory chapter defines the fundamental types of damage amenable to heat-straightening repair. Chapter 2 describes the basics of heat straightening including: Why heat straightening works, types of heats, basic damage and heating patterns, equipment and its use and practical considerations. Chapter 3 describes methods of assessing, planning and conducting successful repairs along with common mistakes to avoid.

Part II is a technical guide to heat straightening directed primarily to engineers. Chapters 4-6 provide details on affects of heating on material properties of steel, behavior of flat plates and response of rolled shapes subjected to heat straightening.

Chapter 7 provides technical information on damaged composite beams and proper methods to repair them. Chapter 8 addresses axially loaded members and Chapter 9 discusses local damage. For all cases the proper heating patterns are used and the response is measured. Results are illustrated graphically and methods are given for predicting behavior.

Part III contains guides, specifications and reference material. A comprehensive literature review is given in Chapter 10. A concise engineering guide to heat straightening is given in Chapter 11. A set of recommended specifications is given in Chapter 12 for selecting a heat straightening contractor as well as technical specifications which can be incorporated into a contract. Finally, a bibliography, glossary and list of nomenclature are given in Chapters 13-15. Revisions and errata are included in Appendix.

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